

**United States of America**  
**DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE<sup>1</sup>**

**Agenda Item 1.15a:** to review the results of studies concerning the radionavigation-satellite service in accordance with Resolutions **604 (WRC-2000)**, **605 (WRC-2000)** and **606 (WRC-2000)**;

**Background Information:** WRC-2000 introduced new allocations in the band 1 164-1 215 MHz for use by the radionavigation-satellite service (RNSS) (space-to-space) and (space-to-Earth) with a provisional aggregate power-flux-density (pfd) limit of -115 dB (W/m<sup>2</sup>) in any 1 MHz band produced at the Earth's surface by all space stations within all RNSS systems and for all angles of arrival. It also stated in **5.328A** of the Radio Regulations that the provisions of Resolution **605 (WRC-2000)** apply. There was extensive discussion at WRC-2000 with regard to the need for a pfd limit and the value needed to protect aeronautical radionavigation service (ARNS) systems (including Distance Measuring Equipment (DME)). Resolution **605 (WRC-2000)** requested the ITU-R to study the technical, operational, and regulatory aspects of compatibility between RNSS and ARNS in the band 9 60-1 215 MHz, including an assessment of the need for an aggregate pfd limit. If such a need exists, the ITU-R was requested to revise, if necessary the provisional pfd limit given in **5.328A** concerning the operation of RNSS systems in the frequency band 1 164 – 1 215 MHz.

The ITU-R has determined that ARNS systems require protection from the aggregate of emissions from RNSS systems and networks that collectively exceed -116.8 dB (W/m<sup>2</sup>) in any 1 MHz produced at the Earth's surface. There is, however, no reliable way for the Radiocommunication Bureau (BR) to validate compliance by all RNSS systems with an aggregate pfd limit. Studies within the ITU-R reveal that there are a number of profound technical and regulatory reasons why establishment of the regulatory device of a permanent aggregate pfd limit on RNSS emissions in the 1 164-1 215 MHz band would fail to provide the protection to ARNS systems that is required and intended under **No. 5.328A** of the Radio Regulations. It would significantly and unduly constrain the development and implementation of RNSS systems in this band.

Addressing Resolution **605 (WRC-2000)**, the United States has a strong need for both use of the RNSS spectrum and the continued operation of ARNS systems in the 1 164-1 215 MHz band. Furthermore, the U.S. is committed to protecting current and future ARNS systems operating in the same band as RNSS from harmful interference. This protection needs to be provided without unnecessarily delaying or hindering the implementation and provision of RNSS (space-to-Earth).

Based on its studies, the ITU has identified a single regulatory approach for achieving the meaningful protection of the ARNS without unduly constraining RNSS development and operation. This approach mandates the provision of aggregate interference protection at the level identified in ITU-R studies, but commits enforcement of the requirement to those administrations that actually operate and actually intend to operate RNSS systems. The approach manages the total amount of interference caused by these systems through the collaborative agreement on the part of administrations proposing and operating the RNSS systems. In this manner, there is no additional regulatory burden for the BR (which will not be tasked to validate compliance with the protection criterion); there will be a need for coordination among RNSS operators (both formal in an Article 9 sense and informal thereafter pursuant to the provisions of the proposed new resolution and associated provisions in the Radio Regulations); and neither ARNS systems nor RNSS operators are faced with artificial or insufficient

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<sup>1</sup> This is a revision to the original U.S. proposal on this agenda item (06/26/02)

regulations that could leave them exposed to interference or forced to make unnecessary adjustments that inhibit the efficient use of the orbital/spectrum resource. The approach also takes account of the Radio Regulations Board (RRB) concern about having multiple inconsistent regulations applicable to the same band.

**Proposal:**

**USA/ /1 (MOD)**

**960-1 215 MHz**

Allocation to services		
Region 1	Region 2	Region 3
<b>960-1 215</b>	AERONAUTICAL RADIONAVIGATION 5.328	
	<b>MOD 5.328A</b>	

**Reasons:** Consequential change.

**USA/ /2 NOC**

**5.328**

**Reasons:** The current text is adequate.

**USA/ /3 MOD**

**5.328A** *Additional allocation:* the band 1 164-1 215 MHz is also allocated to the radionavigation-satellite service (space-to-Earth) (space-to-space) on a primary basis. ~~The aggregate power flux density produced by all the space stations of all radionavigation-satellite systems at the Earth's surface shall not exceed the provisional value of 115 dB(W/m<sup>2</sup>) in any 1 MHz band for all angles of arrival. Stations in the radionavigation-satellite service in the band 1 164-1 215 MHz shall not cause harmful interference to, nor claim protection from, stations of the aeronautical radionavigation service. operate in accordance with the provisions of Resolution **RNSS (WRC-03)**. The provisions of Resolution **605 (WRC-2000)** apply (WRC 2000).~~ and shall not claim protection from stations in the aeronautical-radionavigation service. **No. 5.43A** does not apply. Use of the band 1 164-1 215 MHz by the radionavigation-satellite service is subject to the application of the provisions of Nos. **9.12, 9.12A, and 9.13**. The provisions of **No. 21.18** apply.

**Reasons:** The suppression of the second and modification of the third sentence reflect the incorporation into new Resolution **RNSS (WRC-03)** and associated Radio Regulations (see below) of the mechanisms for ensuring the protection of ARNS against harmful interference from RNSS (space-to-Earth) systems.

By making non-geostationary (non-GSO) RNSS systems subject to Article 9 coordination obligations with respect to each other and with geostationary (GSO) RNSS systems (**Nos. 9.12 and 9.12A**), and by making GSO RNSS systems coordinate with non-GSO RNSS systems under **No. 9.13**, the Radio Regulations will provide an early start on discussions between administrations operating or planning to operate RNSS systems. This will help ensure that the objective of assuring compliance with the

aggregate protection criterion for ARNS in new Resolution **RNSS (WRC-03)** (see below) is met. GSO RNSS systems are already obliged to coordinate with each other under **No. 9.7**.

Discussions between RNSS administrations, both during formal coordination and after, are critical to the success of the regulatory determination to commit to administrations the obligation to ensure that the aggregate protection criterion of the ARNS is satisfied. Thus, the new provision in new **No. 21.18** (see below) is specifically referenced.

**USA/ /4 ADD**

**Section VI – Protection of aeronautical radionavigation service systems from aggregate emissions of space stations of radionavigation-satellite service systems in the 1 164-1 215 MHz band**

**21.18** § 7 Administrations operating or planning to operate radionavigation-satellite service systems or networks in the 1 164-1 215 MHz frequency band, for which complete coordination or notification information, as appropriate, was received by the Bureau after 2 June 2000, shall, in accordance with *resolves* 2 of Resolution **RNSS (WRC-03)**, take all necessary steps to ensure that the actual aggregate interference into aeronautical radionavigation service systems caused by such RNSS systems or networks operating co-frequency in these frequency bands does not exceed the aggregate power level shown in *resolves* 1 Resolution **RNSS (WRC-03)**.

**Reasons:** Article **21** of the Radio Regulations addresses sharing between terrestrial and space services in frequency bands above 1 GHz. Placement of this provision in a new Section **VI** of Article **21** brings into the Radio Regulations the critical elements from new Resolution **RNSS (WRC-03)** (see proposal below) that make mandatory the collective obligation of administrations operating RNSS systems at 1 164-1 215 MHz to ensure that the aggregate protection criterion from *resolves* 1 of Resolution **RNSS** is not exceeded, as well as the requirement to reduce emissions if administrations operating ARNS systems identify excess emission levels.

**USA/ /5 ADD**

**RESOLUTION RNSS (WRC-2003)**

**Protection of aeronautical radionavigation service systems from the aggregate power flux-density produced by radionavigation-satellite service networks and systems in the 1 164-1 215 MHz frequency band**

The World Radiocommunication Conference (Geneva, 2003),

*considering*

- a)* that the band 960-1 215 MHz is allocated on a primary basis to the aeronautical radionavigation service (ARNS) in all Regions;
- b)* that the band 1 164-1 215 MHz is also allocated on a primary basis to the radionavigation-satellite service (RNSS), subject to the condition in **No. 5.328A** that operation of RNSS systems shall be in accordance with this Resolution;

- c) that protection of the ARNS from harmful interference can be achieved if the value of the equivalent power flux-density (epfd) produced by all the space stations of all RNSS (space-to-Earth) systems in the band referred to in *considering* a) does not exceed the level of -121.5dB(W/m<sup>2</sup>) in any 1 MHz band;
- d) that WRC-2000 adopted Resolution **605 (WRC-2000)** to provide for implementation of a provisional aggregate power flux-density limit during the period between WRC-2000 and WRC-2003, and requested ITU-R studies on the need for an aggregate pfd limit, and revision, if necessary, of the provisional pfd limit given in No. **5.328A**;
- e) that only a limited number of RNSS systems are expected to be deployed in the 1 164-1 215 MHz band, and only a few of these systems at most would have overlapping frequencies;
- f) that ARNS systems can be protected without placing undue constraints on the development and operation of RNSS systems in this band;
- g) that to achieve the objectives in *considering* f), administrations operating RNSS systems will need to agree cooperatively to achieve the level of protection for ARNS systems that is stated in *considering* c);
- h) that it may be appropriate for representatives of administrations operating ARNS systems to be involved in determinations made pursuant to *considering* g);

*resolves*

- 1 that, in order to protect ARNS systems, administrations shall ensure, without validation by the Radiocommunication Bureau pursuant either to **No. 11.31** or **9.35** of the Radio Regulations, that the equivalent pfd level produced by all space stations of all RNSS systems does not exceed the level, -121.5 dB(W/m<sup>2</sup>) in any 1 MHz band;
- 2 that administrations operating or planning to operate in the 1 164-1 215 MHz frequency band RNSS systems or networks for which complete coordination or notification information, as appropriate, was received by Radiocommunication Bureau after 2 June 2000, in collaboration, shall take all necessary steps, including by means of appropriate modifications to their systems or networks, to ensure that the aggregate interference into ARNS systems caused by such RNSS systems or networks operating co-frequency in these frequency bands does not exceed the level of the aggregate protection criterion given in *resolves* 1 above;
- 3 that administrations, in carrying out their obligations under *resolves* 1 and 2 above, shall take into account only those RNSS systems with frequency assignments in the band 1 164-1 215 MHz that have met all of the milestones listed in the Annex to this Resolution;
- 4 that no single RNSS system shall be permitted to use up the entire interference allowance specified in *resolves* 1 above in any 1 MHz of the 1164-1215 MHz band;
- 5 that administrations shall communicate to the Bureau the results of any aggregate sharing determinations made in application of *resolves* 2 above, without regard to whether such determinations result in any modifications to the published characteristics of their respective systems or networks;

6 that administrations operating ARNS systems in the 1 164-1 215 MHz band should participate, as appropriate, in discussions and determinations relating to the resolves above,

*invites the ITU-R*

to continue to develop, as a matter of urgency a suitable methodology for calculating the epfd produced by all RNSS systems operating or planning to operate co-frequency in the 1 164-1 215 MHz frequency band into ARNS systems, which may be used by administrations to determine whether the systems are in compliance with the epfd levels given in *resolves 1* above.

## ANNEX

### Milestone Criteria for Application of Resolution RNSS

1. Submission of appropriate ITU Advance Publication, and Coordination or Notification documentation.

2. Entry into satellite manufacturing or procurement agreement:

The RNSS system or network operator should possess clear evidence of a binding agreement for the manufacture or procurement of its satellites. The agreement should identify the contract milestones leading to the completion of manufacture or procurement of satellites required for the service provision. The Notifying Administration is responsible for authenticating the evidence of agreement and providing such evidence to other interested administrations in furtherance of its obligations under this Resolution.

3. Entry into satellite launch agreement:

The RNSS system or network operator should possess clear evidence of a binding agreement to launch its satellites. The agreement should identify the launch date, launch site, and launch service provider. The Notifying Administration is responsible for authenticating the evidence of agreement and providing such evidence to other interested administrations in furtherance of its obligations under this Resolution.

**Reasons:** This resolution and annex, along with incorporating provisions in Articles **5 (MOD 5.328A)** and **21 (ADD Section VI)**, provides the mechanism by which administrations operating or planning to operate RNSS systems, all of which also operate co-frequency ARNS systems, will undertake the responsibility for ensuring the protection of ARNS systems. The resolution recognizes that there is a need for discussions between and among administrations operating RNSS systems to ensure compliance with the obligation to protect ARNS systems, and that such discussions may involve administrations operating ARNS systems. Resolution **RNSS** thus provides a basis for managing the total aggregate interference caused to ARNS systems by real RNSS systems.

USA/ /6 SUP

### RESOLUTION 605 (WRC-2000)

**Reasons:** This resolution is no longer needed because of the changes made to **5.328A**, the addition of Section **VI** to Article **21** and the addition of Resolution **RNSS**.

TABLE 5-1 (continued)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. 9.7 GSO/GSO (cont.)		<p>3) 17.7-20.2 GHz, and 27.5-30 GHz</p> <p>4) <u>1 164 – 1 215 MHz</u></p> <p>45) All frequency bands, other than those in § 1), 2) and 3), allocated to a space service, and the bands in § 1), 2) and 3) where the radio service of the proposed network or affected networks is other than the FSS, or in the case of coordination of space stations operating in the opposite direction of transmission</p>	<p>i) Bandwidth overlap, and</p> <p>ii) any network in the FSS with a space station within an orbital arc of <math>\pm 8^\circ</math> of the nominal orbital position of a proposed network in the FSS</p> <p><u>Bandwidth overlap</u></p> <p>Value of <math>\Delta T/T</math> exceeds 6%</p>	Appendix 8	the network of this administration will not be affected because value of $\Delta T/T$ calculated by the method in § 2.2.1.2 and 3.2 of Appendix 8 do not exceed 6%. When the Bureau, at the request of an administration, studies this information pursuant to No. 9.42, the calculation method given in § 2.2.1.2 and 3.2 of Appendix 8 shall be used

Reasons: Consequential.